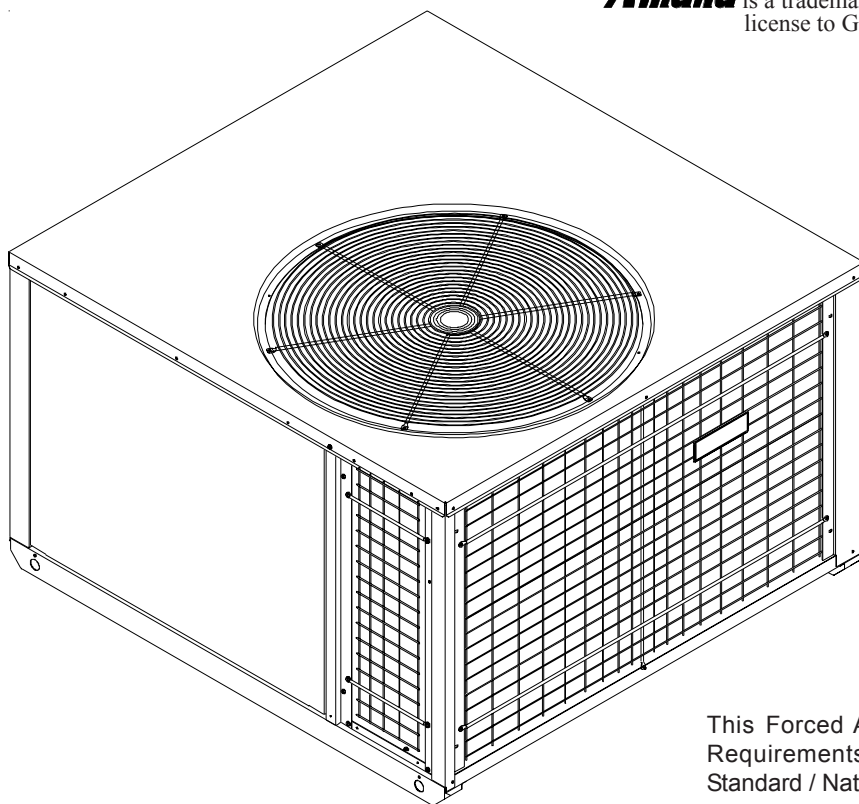


Package Gas-Electric Installation Instructions

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This Forced Air Central Unit Design Complies With Requirements Embodied in The American National Standard / National Standard of Canada Shown Below.

ANSI Z21.47•CSA-2.3 Central Furnaces

TO THE INSTALLER

Before installing this unit please read this manual to familiarize yourself on the specific items which must be adhered to such as maximum external static pressure to unit, air temperature rise, minimum or maximum CFM and motor speed connections.

TO THE OWNER

It is important to complete the owner registration card and mail it immediately. This will assist us in contacting you if any service or warranty information should change in the future. When completing the registration card, be sure to include the Model, Manufacturing and Serial Numbers, plus the installation date.

The warranty certificate is also supplied with the unit. Read the warranty carefully and note what is covered. Keep the warranty certificate in a safe place so you can find it if necessary.

If additional operating instructions are required, call the dealer where the purchase was made. Keep this literature in a safe place for future reference.

These installation instructions cover the **outdoor** installation of single package gas electric heating and cooling units. See the Product Data Book applicable to your model* for information regarding accessories.

*NOTE: Please contact your distributor or our website for the applicable product data book referred to in this manual.

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SAFETY INSTRUCTIONS

RECOGNIZE SAFETY SYMBOLS, WORDS, AND LABELS

The following symbols and labels are used throughout this manual to indicate immediate or potential safety hazards. It is the owner's and installer's responsibility to read and comply with all safety information and instructions accompanying these symbols. Failure to heed safety information increases the risk of personal injury, property damage, and/or product damage.

WARNING

WARNING - Hazards or unsafe practices which COULD result in severe personal injury or death.

CAUTION

CAUTION - Hazards or unsafe practices which COULD result in minor or moderate personal injury, product damage, property damage.

WARNING

IF THE INFORMATION IN THESE INSTRUCTIONS IS NOT FOLLOWED EXACTLY, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.

- DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.
- **WHAT TO DO IF YOU SMELL GAS:**
 - DO NOT TRY TO LIGHT ANY APPLIANCE.
 - DO NOT TOUCH ANY ELECTRICAL SWITCH; DO NOT USE ANY PHONE IN YOUR BUILDING.
 - IMMEDIATELY CALL YOUR GAS SUPPLIER FROM A NEIGHBOR'S PHONE. FOLLOW THE GAS SUPPLIER'S INSTRUCTIONS.
 - IF YOU CANNOT REACH YOUR GAS SUPPLIER, CALL THE FIRE DEPARTMENT.
- INSTALLATION AND SERVICE MUST BE PERFORMED BY A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER.

WARNING

THIS PRODUCT CONTAINS OR PRODUCES A CHEMICAL OR CHEMICALS WHICH MAY CAUSE SERIOUS ILLNESS OR DEATH AND WHICH ARE KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

WARNING

SHOULD OVERHEATING OCCUR OR THE GAS SUPPLY FAIL TO SHUT OFF, TURN OFF THE MANUAL GAS SHUTOFF VALVE EXTERNAL TO THE FURNACE BEFORE TURNING OFF THE ELECTRICAL SUPPLY.

WARNING

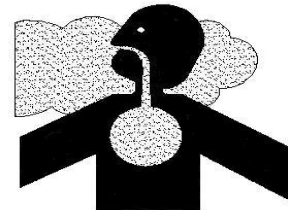
TO AVOID PROPERTY DAMAGE, PERSONAL INJURY OR DEATH, DO NOT USE THIS UNIT IF ANY PART HAS BEEN UNDER WATER. IMMEDIATELY CALL A QUALIFIED SERVICE TECHNICIAN TO INSPECT THE FURNACE AND TO REPLACE ANY PART OF THE CONTROL SYSTEM AND ANY GAS CONTROL HAVING BEEN UNDER WATER.

WARNING

THIS UNIT MUST NOT BE USED AS A "CONSTRUCTION HEATER" DURING THE FINISHING PHASES OF CONSTRUCTION ON A NEW STRUCTURE. THIS TYPE OF USE MAY RESULT IN PREMATURE FAILURE OF THE UNIT DUE TO EXTREMELY LOW RETURN AIR TEMPERATURES AND EXPOSURE TO CORROSIVE OR VERY DIRTY ATMOSPHERES.



DANGER
PELIGRO



CARBON MONOXIDE POISONING HAZARD

Special Warning for Installation of Furnace or Air Handling Units in Enclosed Areas such as Garages, Utility Rooms or Parking Areas

Carbon monoxide producing devices (such as an automobile, space heater, gas water heater, etc.) should not be operated in enclosed areas such as unventilated garages, utility rooms or parking areas because of the danger of carbon monoxide (CO) poisoning resulting from the exhaust emissions. If a furnace or air handler is installed in an enclosed area such as a garage, utility room or parking area and a carbon monoxide producing device is operated therein, there must be adequate, direct outside ventilation.

This ventilation is necessary to avoid the danger of CO poisoning which can occur if a carbon monoxide producing device continues to operate in the enclosed area. Carbon monoxide emissions can be (re)circulated throughout the structure if the furnace or air handler is operating in any mode.

CO can cause serious illness including permanent brain damage or death.

B10259-216

WARNING

HEATING UNIT SHOULD NOT BE UTILIZED WITHOUT REASONABLE, ROUTINE, INSPECTION, MAINTENANCE AND SUPERVISION. IF THE BUILDING IN WHICH ANY SUCH DEVICE IS LOCATED WILL BE VACANT, CARE SHOULD BE TAKEN THAT SUCH DEVICE IS ROUTINELY INSPECTED, MAINTAINED AND MONITORED. IN THE EVENT THAT THE BUILDING MAYBE EXPOSED TO FREEZING TEMPERATURES AND WILL BE VACANT, ALL WATER-BEARING PIPES SHOULD BE DRAINED, THE BUILDING SHOULD BE PROPERLY WINTERIZED, AND THE WATER SOURCE CLOSED. IN THE EVENT THAT THE BUILDING MAY BE EXPOSED TO FREEZING TEMPERATURES AND WILL BE VACANT, ANY HYDRONIC COIL UNITS SHOULD BE DRAINED AS WELL AND, IN SUCH CASE, ALTERNATIVE HEAT SOURCES SHOULD BE UTILIZED.

UNIT LOCATION



WARNING

TO PREVENT POSSIBLE EQUIPMENT DAMAGE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH, THE FOLLOWING BULLET POINTS MUST BE OBSERVED WHEN INSTALLING THE UNIT.

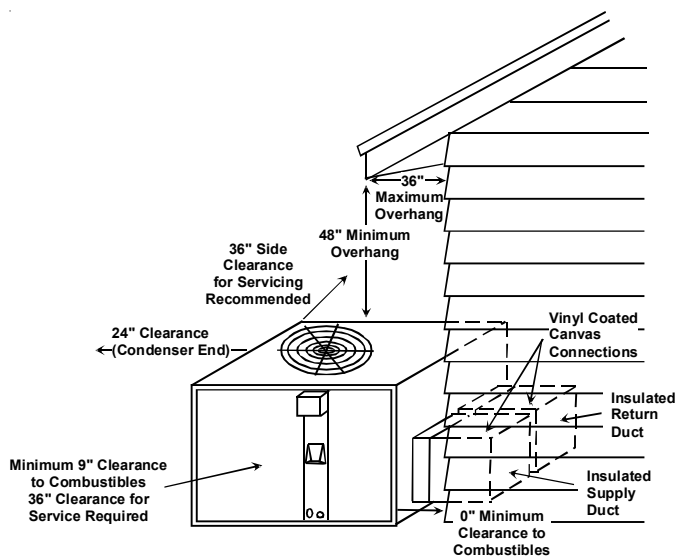
ALL INSTALLATIONS:

- For proper flame pattern within the heat exchanger and proper condensate drainage, the unit must be mounted level.
- The flue outlet hood must be at least 12 inches from any opening through which flue gases could enter a building, and at least three feet above any forced air inlet located within ten feet. The economizer/manual fresh air intake/ motorized fresh air intake and combustion air inlet mounted on the unit are not affected by this restriction.
- To avoid possible corrosion of the heat exchanger, do not locate the unit in an area where the outdoor air (i.e. combustion air for the unit) will be frequently contaminated by compounds containing chlorine or fluorine. Common sources of such compounds include swimming pool chemicals and chlorine bleaches, paint stripper, adhesives, paints, varnishes, sealers, waxes (which are not yet dried) and solvents used during construction and remodeling. Various commercial and industrial processes may also be sources of chlorine/fluorine compounds.
- To avoid possible illness or death of the building occupants, do NOT locate outside air intake device (economizer, manual fresh air intake, motorized fresh air intake) too close to an exhaust outlet, gas vent termination, or plumbing vent outlet. For specific distances required, consult local codes.
- Allow clearances from the enclosure as shown for fire protection, proper operation, and service access. These clearances must be permanently maintained.



CAUTION

TO AVOID PROPERTY DAMAGE, PERSONAL INJURY OR DEATH DUE TO FIRE, CLEARANCES TO COMBUSTIBLE SURFACES LISTED IN THE FIGURE BELOW MUST BE OBSERVED.



Minimum Clearances for Unit

*NOTE: Please contact your distributor or our website for the applicable product data book referred to in this manual.

- The combustion air inlet and flue outlet hoods on the side of the unit must never be obstructed. If used, do not allow the economizer/manual fresh air damper/ motorized fresh air damper to become blocked by snow or debris. In some climates or locations, it may be necessary to elevate the unit to avoid these problems.
- When the unit is heating, the temperature of the return air entering the unit must be between 50° F and 100° F.
- Provisions must be made for adequate combustion and ventilation air in accordance with Section 5.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, NFPA 54/ ANSI Z223.1, or Sections 7.2, 7.3 or 7.4 of CAN/ CSA B149 Installation Codes, or applicable provisions of the local building codes.

GROUND LEVEL INSTALLATIONS ONLY

- When the unit is installed on the ground adjacent to the building, a level concrete (or equal) base is recommended. Prepare a base 47 inches by 49 inches or slightly larger and 3 inches thick.
- The base should also be located where no runoff of water from higher ground can collect in the unit.

ROOFTOP INSTALLATIONS ONLY

- To avoid possible personal injury or property damage, the roof must have sufficient structural strength to carry the weight of the unit(s) and snow or water loads as required by local codes.
- The unit may be installed directly on wood floors or on Class A, Class B, or Class C roof covering material.
- To avoid possible personal injury, a safe, flat surface for service personnel should be provided.

NOTE: Refer to the Product Data Book applicable to your model* or the unit Rating Plate for approved duct orientation, before using down discharge openings.

This unit is approved only for an outdoor installation.

GENERAL INFORMATION

To assure that your unit operates safely and efficiently, it must be installed, operated, and maintained in accordance with these installation and operating instructions, all local building codes and ordinances, or in their absence, with the latest edition of the National Fuel Gas Code NFPA54/ANSI Z223.1 and National Standard of Canada CAN/CSA-2.3.

The heating and cooling capacities of the unit should be greater than or equal to the design heating and cooling loads of the area to be conditioned. The loads should be calculated by an approved method or in accordance with A.S.H.R.A.E. Guide or Manual J - Load Calculations published by the Air Conditioning Contractors of America.

Obtain from:

American National Standards Institute
1430 Broadway
New York, NY 10018



WARNING

TO PREVENT PROPERTY DAMAGE, PERSONAL INJURY OR DEATH, DUE TO FIRE, EXPLOSIONS, SMOKE, SOOT, CONDENSATION, ELECTRIC SHOCK OR CARBON MONOXIDE, THIS UNIT MUST BE PROPERLY INSTALLED, REPAIRED, OPERATED, AND MAINTAINED.

SHIPPING AND HANDLING

Units are securely packed in shipping containers approved by the International Safe Transit Association. Check the carton upon arrival for external damage. If damage is found, file a request in writing for inspection by the carrier agent immediately. The carrier is responsible for making prompt inspection of damage and for a thorough investigation of each claim. The distributor or manufacturer will not accept claims from dealers for transportation damage. If no damage is found, carefully remove all shipping material and properly dispose of it. Keep the unit as upright as possible. Laying the unit on its side or top could cause equipment damage.

RIGGING AND HANDLING



WARNING

TO PREVENT PROPERTY DAMAGE, THE UNIT SHOULD REMAIN IN AN UPRIGHT POSITION DURING ALL RIGGING AND MOVING OPERATIONS. TO FACILITATE LIFTING AND MOVING WHEN A CRANE IS USED, PLACE THE UNIT IN AN ADEQUATE CABLE SLING.

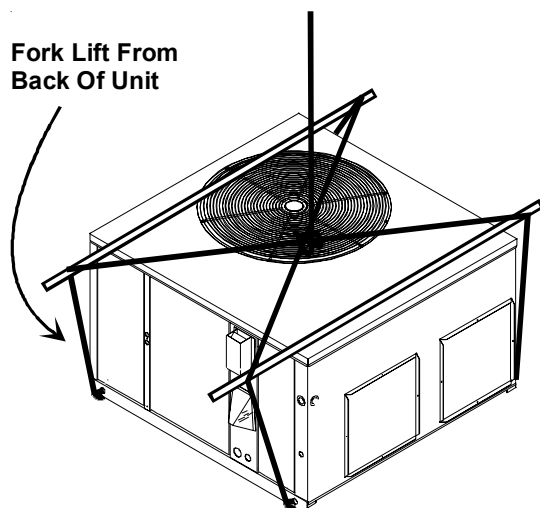
NOTE: Refer to Product Data Book applicable to your model* or the unit Rating Plate for approved duct orientation, before using down discharge openings.

Important: If using bottom discharge with roof curb, ductwork should be attached to the curb prior to installing the unit. Ductwork dimensions are shown in roof curb installation instructions.

Refer to the Roof Curb Installation Instructions for proper curb installation. Curbing must be installed in compliance with the National Roofing Contractors Association Manual.

Lower unit carefully onto roof mounting curb. While rigging unit, center of gravity will cause condenser end to be lower than supply air end.

If using a fork lift, see the following figure for location of fork prongs. Make certain prongs support unit weight.



Fork Lift Unit Positioning

PROPER PIPING PRACTICE

The gas line installation must comply with local codes, or in the absence of local codes, with the latest edition of the National Fuel Gas Code NFPA 54/ANSI Z223.1.

IMPORTANT NOTE: This unit is factory set to operate on **natural gas** at the altitudes shown on the rating plate. The plate is stamped with the model number, type of gas and gas input rating. Make sure the unit is equipped to operate on the type of gas available.

DO NOT VARY FROM THE MINIMUM SUPPLY PRESSURE GIVEN IN THE INLET GAS PRESSURE TABLE.

Doing so could create ignition problems.

Inlet Gas Pressure	
Natural	Min. 5.0" W.C., Max. 10.0" W.C.
Propane	Min. 11.0" W.C., Max. 13.0" W.C.

Inlet Gas Pressure Must Not Exceed the Maximum Value Shown in Table Above.

DO NOT EXCEED THE RATED INPUT SHOWN ON THE RATING PLATE.

Overfiring of the unit could result in premature heat exchanger failure.

DO NOT UNDERSIZE THE NATURAL/PROPANE GAS PIPING FROM THE METER/TANK TO THE UNIT.

Doing so could cause unsatisfactory operation or equipment damage due to under firing of equipment.

When sizing a trunk line, include all appliances on that line that could be operated simultaneously.

Natural Gas Capacity of Pipe in Cubic Feet of Gas Per Hour (CFH)					
Length of Pipe in Feet	Nominal Black Pipe Size (inches)				
	1/2	3/4	1	1 1/4	1 1/2
10	132	278	520	1050	1600
20	92	190	350	730	1100
30	73	152	285	590	980
40	63	130	245	500	760
50	56	115	215	440	670
60	50	105	195	400	610
70	46	96	180	370	560
80	43	90	170	350	530
90	40	84	160	320	490
100	38	79	150	305	460

Pressure = .50 PSIG or less and Pressure Drop of 0.3" W.C. (Based on 0.60 Specific Gravity Gas)

$$CFH = \frac{BTUH \text{ Furnace Input}}{\text{Heating Value of Gas (BTU/Cubic Foot)}}$$



WARNING

TO AVOID PROPERTY DAMAGE, PERSONAL INJURY OR DEATH WHEN EITHER USING PROPANE GAS ALONE OR AT HIGHER ALTITUDES, OBTAIN AND INSTALL THE PROPER CONVERSION KIT(S). FAILURE TO DO SO CAN RESULT IN UNSATISFACTORY OPERATION AND/OR EQUIPMENT DAMAGE. HIGH ALTITUDE KITS ARE FOR U.S. INSTALLATIONS ONLY AND ARE NOT APPROVED FOR USE IN CANADA.

HIGH ALTITUDE DERATE (U.S. INSTALLATIONS ONLY)

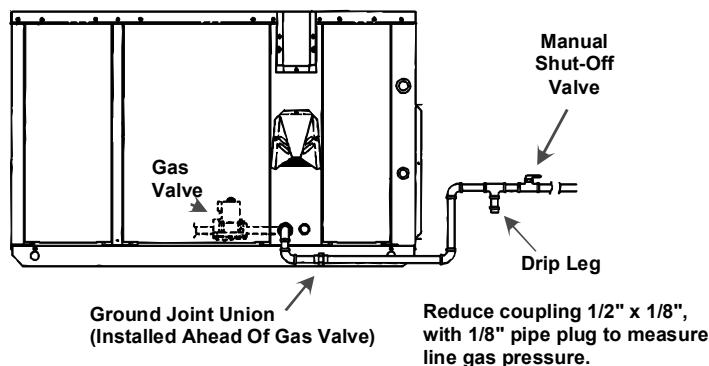
IMPORTANT NOTE: The gas/electric units naturally derate with altitude. Do not attempt to increase the firing rate by changing orifices or increasing the manifold pressure. This can cause poor combustion and equipment failure.

At all altitudes, the manifold pressure must be within 0.3 inches w.c. of that listed in the "Product Data Book applicable to your model*" for the fuel used. At all altitudes and with either fuel, the air temperature rise must be within the range listed on the unit nameplate.

Refer to the following table for kit conversions from natural gas to propane gas and for altitude adjustments.

HIGH ALTITUDE GAS ORIFICE CHART				
Altitude (Ft)	Gas	Kit	Orifice	Manifold Pressure
0 - 6000	Natural	None	#43	3.5" W.C
	Propane	LPTK09	#55	10.0" W.C.
6001 - 11000	Natural	HANG07	#45	3.5" W.C
	Propane	HALP09	#56	10.0" W.C.

NOTE: In Canada, gas furnaces are certified to 4500 feet only.



General Layout at the Unit

Natural Gas Connection

Refer to the above figure for the general layout at the unit. The following rules apply:

1. Use black iron or steel pipe and fittings for the supply piping.
2. Use pipe joint compound on male threads only. Pipe joint compound must be resistant to the action of the fuel used.
3. Use ground joint unions.
4. Install a drip leg to trap dirt and moisture before it can enter the gas valve. The drip leg must be a minimum of three inches long.
5. Use two pipe wrenches when making connection to the gas valve to keep it from turning.
6. Install a manual shut-off valve in a convenient location (within six feet of unit) between the meter and the unit.
7. Tighten all joints securely.
8. The unit must be connected to the building piping by one of the following methods:
 - Rigid metallic pipe and fittings
 - Semirigid metallic tubing and metallic fittings (Aluminum alloy tubing must not be used in exterior locations)
 - Listed gas appliance connectors used in accordance with the terms of their listing that are completely in the same room as the equipment
 - In the prior two methods above the connector or tubing must be protected from physical and thermal damage. Aluminum alloy tubing and connectors must be coated to protect against external corrosion when in contact with masonry, plaster or insulation or are subject to repeated wettings by liquids (water - not rain water, detergents or sewage).

GAS PIPING CHECKS

CAUTION

TO PREVENT PROPERTY DAMAGE OR PERSONAL INJURY DUE TO FIRE, THE FOLLOWING INSTRUCTIONS MUST BE PERFORMED REGARDING GAS CONNECTIONS AND PRESSURE TESTING:

- THE UNIT AND ITS GAS CONNECTIONS MUST BE LEAK TESTED BEFORE PLACING IN OPERATION. **BECAUSE OF THE DANGER OF EXPLOSION OR FIRE, NEVER USE A MATCH OR OPEN FLAME TO TEST FOR LEAKS. NEVER EXCEED SPECIFIED PRESSURES FOR TESTING. HIGHER PRESSURE MAY DAMAGE GAS VALVE AND CAUSE OVERFIRING WHICH MAY RESULT IN PREMATURE HEAT EXCHANGE FAILURE.**
- THIS UNIT AND ITS SHUT-OFF VALVE MUST BE DISCONNECTED FROM THE GAS SUPPLY DURING ANY PRESSURE TESTING OF THAT SYSTEM AT TEST PRESSURES IN EXCESS OF 1/2 **PSIG** (3.48 **kPa**).
- THIS UNIT MUST BE ISOLATED FROM THE GAS SUPPLY SYSTEM BY CLOSING ITS MANUAL SHUT-OFF VALVE DURING ANY PRESSURE TESTING OF THE GAS SUPPLY PIPING SYSTEM AT TEST PRESSURES EQUAL TO OR LESS THAN 1/2 **PSIG** (3.48 **kPa**).

WARNING

TO AVOID PROPERTY DAMAGE OR PERSONAL INJURY, BE SURE THERE IS NO OPEN FLAME IN THE VICINITY DURING AIR BLEEDING.

There will be air in the gas supply line after testing for leaks on a new installation. Therefore the air must be bled from the line. Follow the steps below to bleed air from the gas line.

1. Ensure there is no open flame in the vicinity.
2. Disconnect power to the unit.
3. Loosen the ground joint union until pure gas expels.
4. Tighten joint union and wait five minutes until gas is dispersed.
5. Close the main electrical disconnect switch for the unit.

PROPANE GAS INSTALLATIONS

WARNING

TO AVOID PROPERTY DAMAGE, PERSONAL INJURY OR DEATH DUE TO FIRE OR EXPLOSION CAUSED BY A PROPANE GAS LEAK, INSTALL A GAS DETECTING WARNING DEVICE. SINCE RUST CAN REDUCE THE LEVEL OF ODORANT IN PROPANE GAS, A GAS DETECTING WARNING DEVICE IS THE ONLY RELIABLE WAY TO DETECT A PROPANE GAS LEAK. CONTACT A LOCAL PROPANE GAS SUPPLIER ABOUT INSTALLING A GAS DETECTING WARNING DEVICE.

IMPORTANT NOTE: Propane gas conversion kits must be installed to convert units to propane gas. See *High Altitude Gas Orifice* chart for kit part number for this model.

All propane gas equipment must conform to the safety standards of the National Board of Fire Underwriters (See NBFU Manual 58).

For satisfactory operation, propane gas supply pressure must be 10 inch w.c. at the unit manifold with all gas appliances in operation. Maintaining proper gas pressure depends on three main factors:

1. Vaporization rate, which depends on (a) temperature of the liquid, and (b) wetted surface area of the container or containers.
2. Proper pressure regulation.
3. Pressure drop in lines between regulators, and between second stage regulator and the appliance. Pipe size required

will depend on length of pipe run and total load of all appliances.

TANKS AND PIPING



WARNING

TO PREVENT PROPERTY DAMAGE OR SERIOUS PERSONAL INJURY DUE TO FIRE OR EXPLOSION CAUSED BY A PROPANE GAS LEAK, INSTALL A GAS DETECTING WARNING DEVICE.

IF THE PROPANE GAS UNIT IS INSTALLED IN AN EXCAVATED AREA OR A CONFINED SPACE, A WARNING DEVICE IS REQUIRED DUE TO:

- PROPANE GAS IS HEAVIER THAN AIR AND ANY LEAKING GAS CAN SETTLE IN ANY LOW AREAS OR CONFINED SPACES.
- PROPANE GAS ODORANT MAY FADE, MAKING THE GAS UNDETECTABLE EXCEPT WITH A WARNING DEVICE.

If the presence of gas is suspected, follow the warnings on Page 2 of this manual.

PROPANE GAS PIPE SIZING

Sizing Between First and Second Stage Regulator
Maximum Propane Capacities listed are based on 1 PSIG Pressure Drop at 10 PSIG Setting. Capacities in 1,000 BTU/HR

PIPE OR TUBING LENGTH, FEET	TUBING SIZE, O.D., TYPE L					NOMINAL PIPE SIZE, SCHEDULE 40	
	3/8"	1/2"	5/8"	3/4"	7/8"	1/2"	3/4"
30	309	700	1,303	2,205	3,394	1,843	3,854
40	265	599	1,115	1,887	2,904	1,577	3,298
50	235	531	988	1,672	2,574	1,398	2,923
60	213	481	896	1,515	2,332	1,267	2,649
70	196	446	824	1,394	2,146	1,165	2,437
80	182	412	767	1,297	1,996	1,084	2,267
90	171	386	719	1,217	1,873	1,017	2,127
100	161	365	679	1,149	1,769	961	2,009
150	130	293	546	923	1,421	772	1,613
200	111	251	467	790	1,216	660	1,381
250	90	222	414	700	1,078	585	1,224
300	89	201	378	634	976	530	1,109
350	82	185	345	584	898	488	1,020
400	76	172	321	543	836	454	949

To convert to Capacities at 15 PSIG Settings -- Multiply by 1.130
To convert to Capacities at 5 PSIG Settings -- Multiply by 0.879

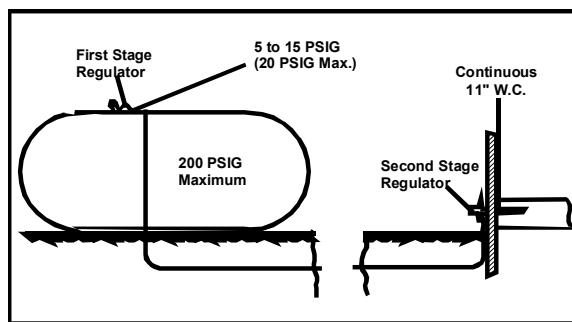
Sizing Between Single or Second Stage Regulator and Appliance*
Maximum Propane Capacities Listed are Based on 1/2" W.C. Pressure Drop at 11" W.C. Setting. Capacities in 1,000 BTU/HR

PIPE OR TUBING LENGTH, FEET	TUBING SIZE, O.D., TYPE L					NOMINAL PIPE SIZE, SCHEDULE 40				
	3/8"	1/2"	5/8"	3/4"	7/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"
10	49	110	206	348	539	291	608	1,146	2,353	3,525
20	34	76	141	239	368	200	418	788	1,617	2,423
30	27	61	114	192	296	161	336	632	1,299	1,946
40	23	52	97	164	253	137	284	541	1,111	1,665
50	20	46	86	146	224	122	255	480	985	1,476
60	19	42	78	132	203	110	231	436	892	1,337
80	16	36	67	113	174	94	198	372	764	1,144
100	14	32	59	100	154	84	175	330	677	1,014
125	12	28	52	89	137	74	155	292	600	899
150	11	26	48	80	124	67	141	265	544	815
200	10	22	41	69	106	58	120	227	465	697
250	9	19	36	61	94	51	107	201	412	618
300	8	18	33	55	85	46	97	182	374	560
350	7	16	30	51	78	43	89	167	344	515
400	7	15	28	47	73	40	83	156	320	479

*DATA IN ACCORDANCE WITH NFPA PAMPHLET NO. 54

Complete information regarding tank sizing for vaporization, recommended regulator settings and pipe sizing is available from most regulator manufacturers and propane gas suppliers. Since propane gas will quickly dissolve white lead or most

standard commercial compounds, special pipe dope must be used. Shellac based compounds resistant to the actions of liquefied petroleum gases such as Gasolac®, Stalactic®, Clyde's® or John Crane® are satisfactory. The figure below shows a typical propane gas installation.



Typical Propane Gas Installation

ELECTRICAL CONNECTIONS

THERMOSTAT

Movement of air must not be obstructed by furniture, door, draperies, etc. The thermostat must be located a minimum of five feet above the floor on a vibration-free inside wall with good air circulation. The thermostat must not be mounted where it will be affected by drafts, hot or cold water pipes or air ducts in walls, radiant heat from fireplace, lamps, the sun, television, etc. Consult the Instruction Sheet packaged with thermostat for mounting instructions. Adjust the heat anticipator in the room thermostat to obtain the proper number of heating cycles per hour and to prevent the room temperature from overshooting the room thermostat setting. Heat anticipator must be set at 0.4 amps.

All units have one stage of heating and one stage of mechanical cooling. **NOTE:** Units with economizers can use thermostats with one or two stages of cooling.

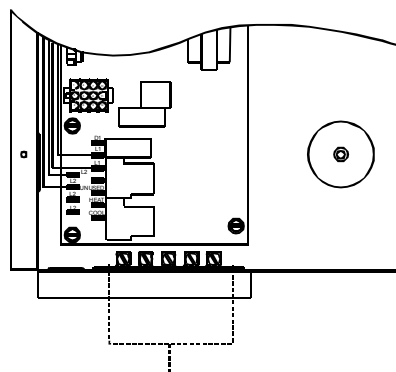


WARNING

TO AVOID INJURY, ELECTRICAL SHOCK OR DEATH, DISCONNECT ELECTRICAL POWER BEFORE SERVICING OR CHANGING ANY ELECTRICAL WIRING.

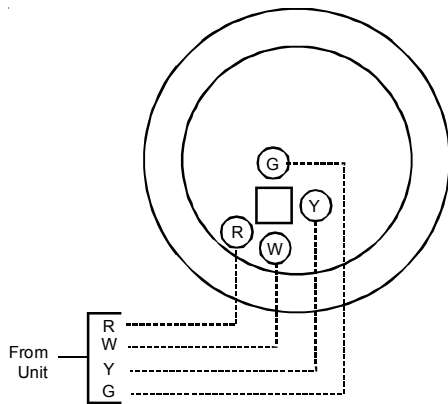
WIRING

All internal wiring in the unit is complete. This unit is designed for 60 hertz current operation at the voltages shown on the rating plate. Bring in the contactor power supply per the supplied unit wiring diagram. Connect the unit control panel to the room thermostat using 24 volt wiring.



Low Voltage Terminal Board

Optional Low Voltage Terminal Board Location



Proper Thermostat Wiring

Refer to the unit wiring diagram for electrical connections. When installed, the unit must be electrically grounded in accordance with local codes or in the absence of local codes, with the National Electrical Code, ANSI/NFPA No. 70, and/or the CSA C22.1 Electrical Code, if an external source is utilized.

! WARNING

TO AVOID THE RISK OF ELECTRICAL SHOCK, WIRING TO THE UNIT MUST BE POLARIZED AND GROUNDED.

! CAUTION

TO AVOID PROPERTY DAMAGE OR PERSONAL INJURY DUE TO FIRE, USE ONLY COPPER CONDUCTORS.

! CAUTION

TO PREVENT IMPROPER AND DANGEROUS OPERATION DUE TO WIRING ERRORS, LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. VERIFY PROPER OPERATION AFTER SERVICING.

The best protection for the wiring is the lowest rated fuse or circuit breaker which will supply power to the unit during normal operation without nuisance trips. Such a device will provide maximum circuit protection. **DO NOT EXCEED THE MAXIMUM OVERCURRENT DEVICE SIZE SHOWN ON UNIT DATA PLATE.**

All line voltage connections must be made through weatherproof fittings. All exterior power supply and ground wiring must be in approved weatherproof conduit. Low voltage wiring from the unit control panel to the thermostat requires coded cable. For ground level and rooftop wiring see figures below.

UNIT VOLTAGE

The unit transformer is factory connected for 230V operation. If the unit is to operate on 208V, reconnect the transformer primary lead and induced draft blower motor leads as shown on the unit wiring diagram.

AIR CIRCULATION AND FILTERS

AIRFLOW CONVERSION

This package gas unit is shipped from the factory with the appropriate blower setting for a normal horizontal discharge installation. Units can easily be converted from horizontal to vertical airflow delivery. In down-discharge or high static installations, the installer should measure the total external static

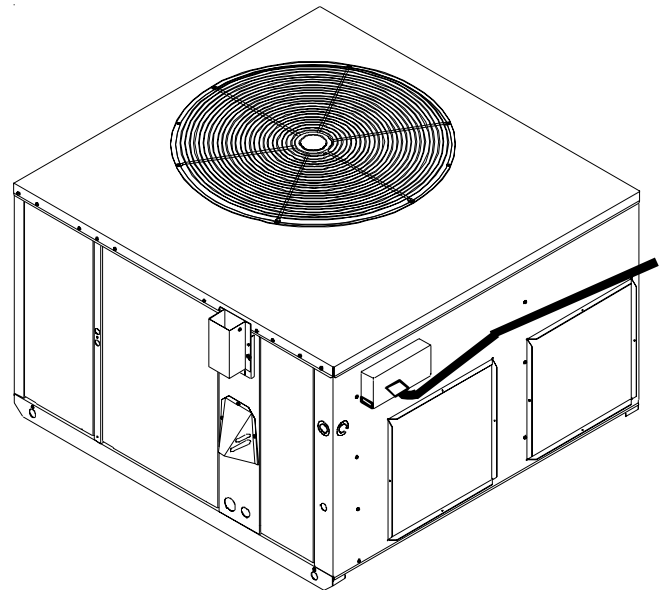
and review the blower performance charts in the Product Data Book applicable to your model*. In some installations it will be necessary to change the blower speed to provide proper air flow.

If converting to down discharge airflow, be sure to refer to the unit rating plate for approved duct orientation and proceed as follows:

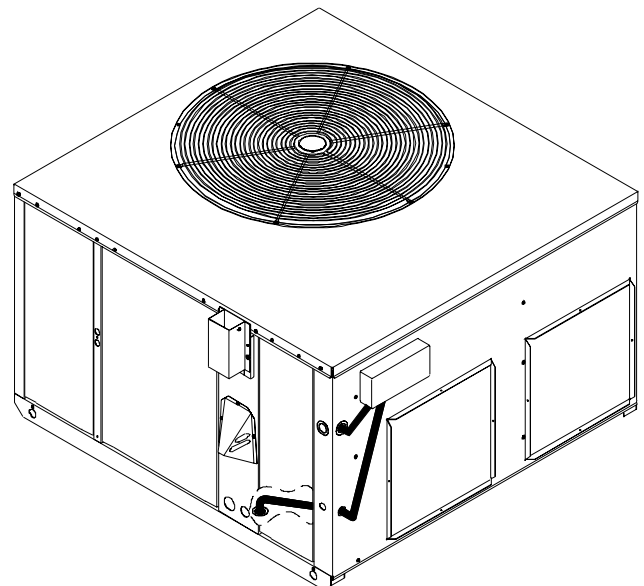
- Cut insulation around bottom openings and remove panels from the bottom of the unit, saving the screws holding the panels in place.
- Install horizontal duct cover kit.

DUCTWORK

Duct systems and register sizes must be properly designed for the C.F.M. and external static pressure rating of the unit. Ductwork should be designed in accordance with the recommended methods of Air Conditioning Contractors of



Electrical Power Directly To Junction Box



Electrical Power Routed Through Bottom of Unit

America Manual D (Residential) or Manual Q (Commercial). All ductwork exposed to the outdoors must include a weatherproof barrier and adequate insulation.

A duct system should be installed in accordance with Standards of the National Board of Fire Underwriters for the Installation of Air Conditioning, Warm Air Heating and Ventilating Systems. Pamphlets No. 90A and 90B.

The warm air supply duct from the unit through a wall fabricated of combustible material may be installed without clearance. However, minimum clearances for the unit must be observed as shown in the *Minimum Clearances for Unit* figure on page 4.

The outlet duct should be provided with an access panel. This access should be large enough to inspect the air chamber downstream from the heat exchanger for any smoke or combustion gas leaks. A cover should be tightly attached to prevent air leaks.

For horizontal airflow, duct flange dimensions on the unit are shown in the Product Data Book applicable to your model*.

For vertical airflow, the ductwork should be attached to the roof curb prior to installing the unit. Ductwork dimensions are shown in the roof curb installation manual.

If desired, supply and return duct connections to the unit may be made with flexible connections to reduce possible unit operating sound transmission.

FILTERS



CAUTION

TO PREVENT PROPERTY DAMAGE DUE TO FIRE AND LOSS OF EQUIPMENT EFFICIENCY OR EQUIPMENT DAMAGE DUE TO DUST AND LINT BUILD UP ON INTERNAL PARTS, NEVER OPERATE UNIT WITHOUT AN AIR FILTER INSTALLED IN THE RETURN AIR SYSTEM.

Even though a return air filter is not supplied with this unit, there must be a means of filtering all return air.

Refer to the following table for filter size information.

Model	Disposable Filter ft ² *	Permanent Filter ft ² **	Rated Cooling Airflow CFM
PGA24C***2(E/F)	3.8	1.9	800
PGA30C***2(E/F)	3.8	1.9	1000
PGA36C***2(E/F)	4.0	2.0	1200
PGA42C***2(E/F)	4.5	2.3	1350
PGA48C***2(E/F)	5.3	2.7	1600
PGA60C***2(E/F)	5.8	2.9	1750
PGB24C***2(E/F)	3.0	1.5	800
PGB30C***2(E/F)	3.5	1.8	1000
PGB36C***2(E/F)	4.0	2.0	1150
PGC42C***2(E/F)	4.5	2.3	1350
PGB42C***2(E/F)	5.0	2.5	1400
PGB48C***2(E/F)	5.5	2.8	1600
PGB60C***2(E/F)	7.0	3.5	2000
PGD24C***2(E/F)	3.0	1.5	800
PGD30C***2(E/F)	3.5	1.8	1000
PGD36C***2(E/F)	4.0	2.0	1150
PGD42C***2(E/F)	4.5	2.3	1350
PGD48C***2(E/F)	5.0	2.5	1500
PGD60C***2(E/F)	6.0	3.0	1750

*Based on a face velocity of 300ft/min.

**Based on a face velocity of 600 ft/min.

If using the Over/Under Transition Kit, the filter(s) may be located in the return air duct(s) or return air filter grille(s). Filters installed external to the unit should be sized in accordance with their manufacturer recommendations. A throwaway filter must be sized for a maximum face velocity of 300 feet per minute.

FILTER INSTALLATION

Important: When installing a filter, the air flow arrows on the filter must point toward the circulator blower.

VENTING

NOTE: Venting is self-contained. Do not modify or block.

FLUE HOOD AND AIR INLET HOOD INSTALLATION

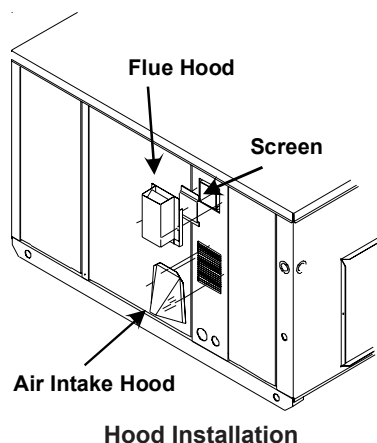
Install the flue hood and air inlet hood prior to operation of the unit.

To install the flue hood cover:

1. Remove the flue hood and bug screen from inside the compressor compartment.
2. Attach the flue hood (enclosed side down) and screen with the sheet metal screw provided.

To install the air inlet hood:

1. Remove hood from the compressor compartment.
2. Attach hood by using the supplied sheet metal screws.



CONDENSATE DRAIN

HIGH STATIC OR DOWN-DISCHARGE INSTALLATION

IMPORTANT: Elevated internal static pressure can cause condensate to be drawn out of the drain pan and into the return air plenum. For gas package units and down discharge installations experiencing total external pressure of 0.30" w.c. or greater, add a splash baffle. It will prevent condensate from seeping over into the return air plenum in high static applications. The baffles are factory installed in all large chassis gas/electric package units. Contact your distributor for the correct splash baffle for your model.

CONDENSATE DRAIN CONNECTION

These units are equipped with a built-in trap and do not require an external trap.

To avoid double trapping and an overflowing drain pan, soft plastic drain lines are not recommended.

NORMAL SEQUENCES OF OPERATION

HEATING

This unit is equipped with an ignition control that automatically lights the main burner. DO NOT attempt to light the main burners by any other method.

1. Thermostat calls for heat. The induced draft blower energizes for a 15-second pre-purge.
2. The spark igniter and gas valve energizes for seven seconds.
NOTE: The igniter produces a very intense electrical spark that ignites the gas.
3. The 30-second HEAT FAN ON delay time begins.
4. The unit delivers heat to the conditioned space until the thermostat is satisfied.
5. The gas valve deenergizes. The induced draft blower continues operation for a 29-second post-purge.
6. Ignition control begins timing the HEAT FAN OFF delay. This allows any additional heat in the heat exchanger to be transferred to the conditioned space. After the HEAT FAN OFF delay time has elapsed, the blower will deenergize.

Models with a PSC (Permanent Split Capacitor) circulator blower motor have an adjustable HEAT FAN OFF delay of 90/120/150 seconds OR 60/90/120/180 seconds. Models with variable speed motor (ECM) have a fixed HEAT FAN OFF delay of 120 seconds.

COOLING

1. Thermostat calls for cooling. The compressor and outdoor fan are energized.
2. Approximately seven seconds later, the indoor fan starts.
NOTE: Models with a variable speed motor (ECM) do not have a seven-second COOL FAN ON delay. The motor "ramps" up to full speed over a 30-second period.
3. The unit will deliver cooling to the conditioned space until the thermostat is satisfied.
4. The compressor and outdoor fan will be deenergized when the thermostat opens.
5. The indoor fan continues to run for approximately 30 seconds after the thermostat is satisfied. This allows additional cooling from the indoor coil to be transferred to the conditioned space. Then, the indoor fan stops.

FAN ONLY

1. Thermostat calls for FAN ONLY by energizing "G".
2. Approximately seven seconds later, the indoor fan starts.
NOTE: Not all models will have a "7-Second ON" indoor fan start delay or an "OFF" delay in continuous fan mode.
3. The indoor fan continues to run for approximately 30 seconds after "G" is deenergized.

STARTUP, ADJUSTMENTS, AND CHECKS

This unit is equipped with an electronic ignition device to automatically light the main burners. It also has a power vent blower to exhaust combustion products.

On new installations, or if a major component has been replaced, the operation of the unit must be checked.

Check unit operation as outlined in the following instructions. If any sparking, odors, or unusual sounds are encountered, shut off electrical power and recheck for wiring errors, or obstructions in or near the blower motors. Duct covers must be removed before operating unit.

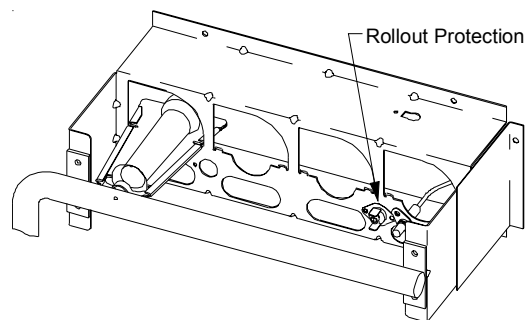
HEATING STARTUP

Heat Anticipator Setting

Set the heat anticipator on the room thermostat to 0.4 amps to obtain the proper number of heating cycles per hour and to prevent the room temperature from overshooting the room thermostat setting.

Rollout Protection Control

The rollout protection device opens, cutting power to the gas valve, if the flames from the burners are not properly drawn into the heat exchanger. The rollout protection device is located on the burner bracket (see figure below). The reason for elevated temperatures at the control should be determined and repaired prior to resetting this manual reset control.



Rollout Protection Device

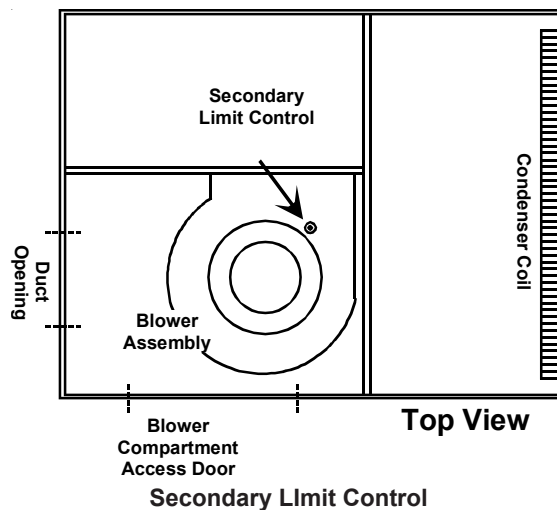
WARNING

TO AVOID PROPERTY DAMAGE, PERSONAL INJURY OR DEATH DUE TO FIRE OR EXPLOSION, A QUALIFIED SERVICER MUST INVESTIGATE THE REASON FOR THE ROLLOUT PROTECTION DEVICE TO OPEN BEFORE MANUALLY RESETTING THE ROLLOUT PROTECTION DEVICE.

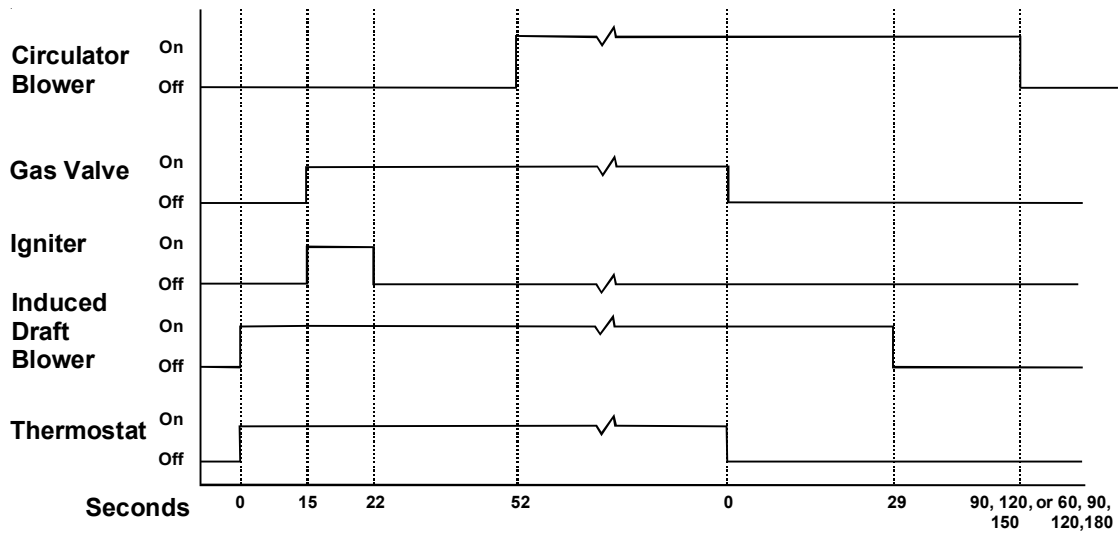
Secondary Limit Control

A second limit control is placed on the blower scroll. This control will open due to elevated temperature caused by the blower failing. The reason for elevated temperatures at the control should be determined and repaired prior to resetting. The secondary limit control is located on the top of the blower scroll assembly (see figure below).

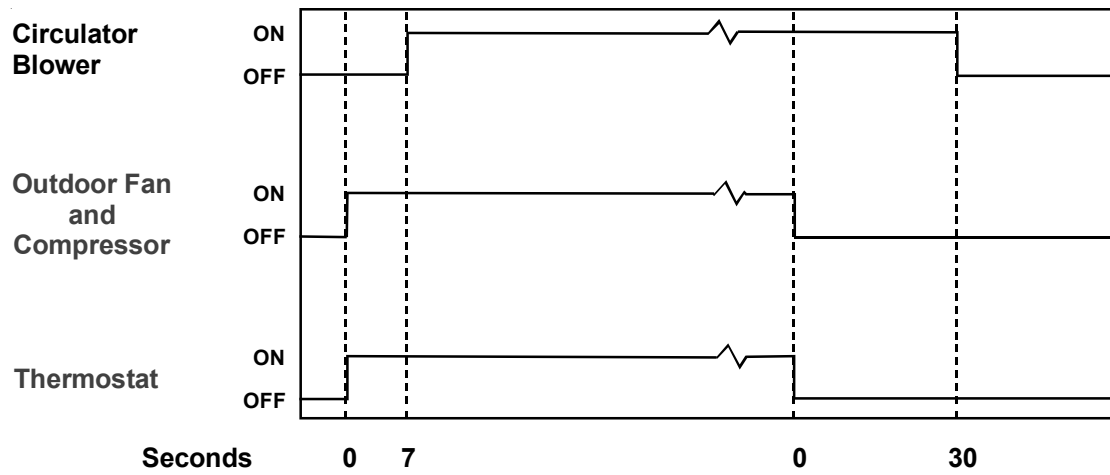
If the power to the unit is interrupted during the heating cycle, it may cause the secondary limit to trip. Once the blower compartment temperature drops below the limit reset temperature, the limit will automatically reset.



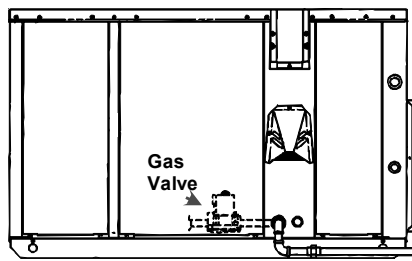
Heating Timing Chart



Cooling Timing Chart



Pre-Operation Checks



Proper Gas Valve Mounting Location

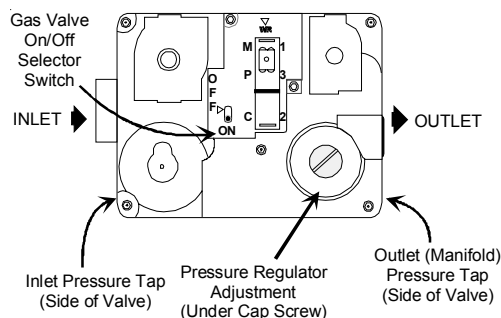
1. Close the manual gas valve external to the unit.
2. Turn off the electrical power supply to the unit.
3. Set the room thermostat to its lowest possible setting.
4. Remove the heat exchanger door on the side of the unit by removing screws.
5. This unit is equipped with an ignition device which automatically lights the main burner. DO NOT try to light burner by any other method.
6. Move or rotate (depending on your gas valve) the gas control valve switch to the OFF position. Do not force.
7. Wait five minutes to clear out any gas.
8. Smell for gas, including near the ground. This is important because some types of gas are heavier than air. If you have waited five minutes and you do smell gas, immediately follow the warnings on page 2 of this manual. If having waited for five minutes and no gas smell is noted, move or rotate the gas control valve switch to the ON position.
9. Replace the heat exchanger door on the side of the unit.
10. Open the manual gas valve external to the unit.
11. Turn on the electrical power supply to the unit.
12. Set the thermostat to desired setting.

Gas Supply And Manifold Check

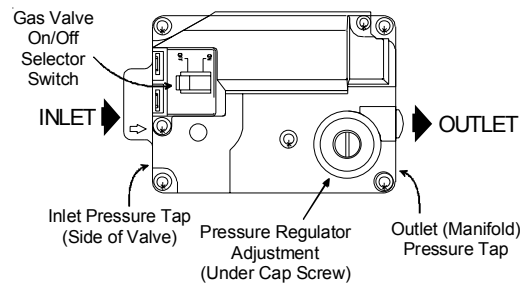
Gas supply pressure and manifold pressure with the burners operating must be as specified on the rating plate.

Gas Inlet Pressure Check

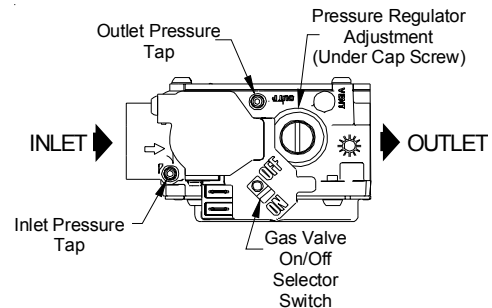
Gas inlet pressure must be checked and adjusted in accordance to the type of fuel being consumed.



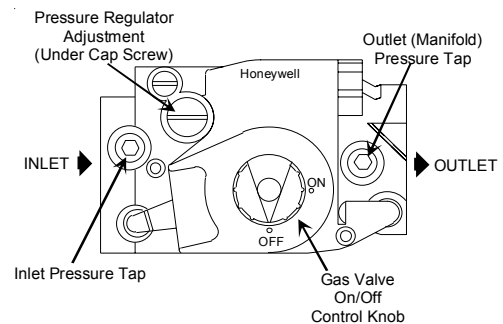
White-Rodgers Model 36E22



White-Rodgers Model 36F22



White-Rodgers 36G22

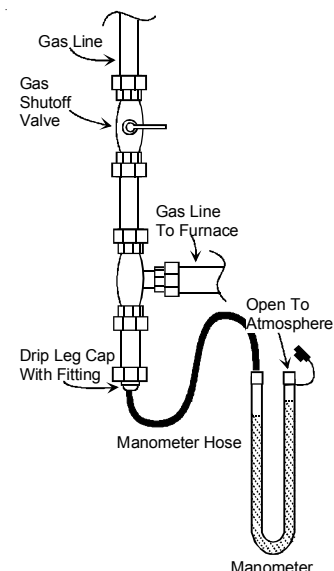


Honeywell Model VR8205

With Power And Gas Off:

Connect a water manometer or adequate gauge to the inlet pressure tap of the gas valve.

Inlet gas pressure can also be measured by removing the cap from the dripleg and installing a predrilled cap with a hose fitting.



Gauge Attachment to Inlet Pressure Tap

With Power And Gas On:

Put unit into heating cycle and turn on all other gas consuming appliances.

Inlet Gas Pressure	
Natural	Min. 5.0" W.C., Max. 10.0" W.C.
Propane	Min. 11.0" W.C., Max. 13.0" W.C.

NOTE: Inlet Gas Pressure Must Not Exceed the Maximum Value Shown.

If operating pressures differ from above, make necessary pressure regulator adjustments, check piping size, etc., and/or consult with local utility.

Manifold Pressure Check

A "U" Tube manometer having a scale range from 0 to 12 inches of water should be used for this measurement. The manifold pressure must be measured with the burners operating.

Honeywell Model VR8205, White-Rodgers Models 36E22/36F22:

A tapped opening is provided in the gas valve to facilitate measurement of the manifold pressure.

White Rodgers Model 36G22:

Using a 3/32 inch hex wrench, loosen the outlet pressure tap screw 1 turn only (DO NOT REMOVE). Attach a length of 5/16 inch hose to the outlet pressure tap boss. Connect the 5/16 inch hose to a water manometer or other adequate gauge.

To adjust the pressure regulator, remove the adjustment screw or cover on the gas valve. Turn out (counterclockwise) to decrease pressure, turn in (clockwise) to increase pressure. Only small variations in gas flow should be made by means of the pressure regulator adjustment. In no case should the final manifold pressure vary more than plus or minus 0.3 inches water column from the specified nominal pressure. Any major changes in flow should be made by changing the size of the burner orifices. The measured input rate to the furnace must not exceed the rating specified on the unit rating plate.

For natural gas, the manifold pressure must be between 3.2 and 3.8 inches water column (3.5 nominal).

For propane gas, the manifold pressure must be between 9.7 and 10.3 inches water column (10.0 nominal).

Gas Input (Natural Gas Only) Check

NOTE: On outdoor equipment, the gas input will vary with the temperature of the gas. Rated input will be obtained at approximately 10° F. With warmer ambient and gas temperatures, the input will decrease. **Example:** At 70° F the input will decrease 12%.

To measure the gas input using the gas meter proceed as follows:

1. Turn off gas supply to all other appliances except the unit.
2. With the unit operating, time the smallest dial on the meter for one complete revolution. If this is a 2 cubic foot dial, divide the seconds by 2; if it is a 1 cubic foot dial, use the seconds as is. This gives the seconds per cubic foot of gas being delivered to the unit.

3. $\text{INPUT} = \text{GAS HTG VALUE} \times 3600 / \text{SEC. PER CUBIC FOOT}$
Example: Natural gas with a heating value of 1000 BTU per cubic foot and 34 seconds per cubic foot as determined by Step 2, then:

$\text{Input} = 1000 \times 3600 / 34 = 106,000 \text{ BTU per Hour.}$ **NOTE:** BTU content of the gas should be obtained from the gas supplier. This measured input must not be greater than shown on the unit rating plate.

4. Relight all other appliances turned off in step 1. Be sure all pilot burners are operating.

Main Burner Flame Check

Flames should be stable, soft and blue (dust may cause orange tips but they must not be yellow) and extending directly outward from the burner without curling, floating or lifting off.

Temperature Rise Check

Check the temperature rise through the unit by placing thermometers in supply and return air registers as close to the unit as possible. Thermometers must not be able to sample temperature directly from the unit heat exchangers, or false readings could be obtained.

1. All registers must be open; all duct dampers must be in their final (fully or partially open) position and the unit operated for 15 minutes before taking readings.
2. The temperature rise must be within the range specified on the rating plate.

NOTE: Air temperature rise is the temperature difference between supply and return air.

With a properly designed system, the proper amount of temperature rise will normally be obtained when the unit is operated at rated input with the recommended blower speed.

If the correct amount of temperature rise is not obtained, it may be necessary to change the blower speed. A higher blower speed will lower the temperature rise. A slower blower speed will increase the temperature rise.

NOTE: Blower speed **MUST** be set to give the correct air temperature rise through the unit as marked on the rating plate.

External Static Pressure Check

The total external static pressure must be checked on this unit to determine if the airflow is proper.

Limit Check

Check limit control operation after 15 minutes of operation by blocking the return air grille(s).

1. After several minutes the main burners must go OFF. Blower will continue to run.
2. Remove air restrictions and main burners will relight after a cool down period of a few minutes.

Adjust the thermostat setting below room temperature.

1. Main burners must go OFF.
2. Circulating Air Blower will continue to run for selected HEAT FAN OFF delay.

Blower Speed Adjustment

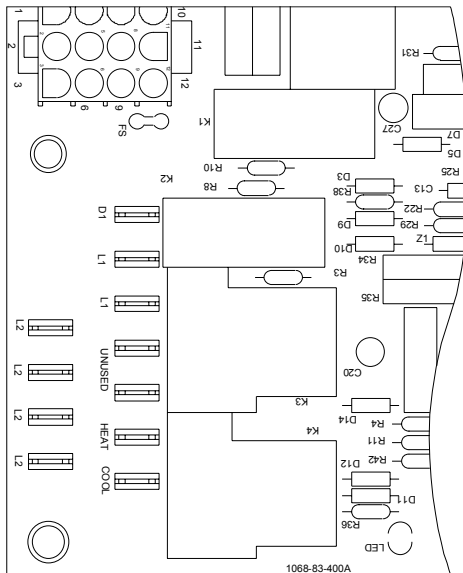


WARNING

TO AVOID PERSONAL INJURY OR DEATH DUE TO ELECTRIC SHOCK, REMOVE ELECTRICAL POWER FROM THE UNIT BEFORE CHANGING SPEED TAPS ON THE BLOWER MOTOR.

Refer to the wiring diagram on the unit to verify speed tap settings.

Blower speeds can be adjusted on the ignition control board. Both heat speed and cool speed terminals are supplied on the board along with two unused motor lead terminals.



Control Board

NOTE: If necessary, adjust HEAT FAN OFF delay settings to obtain satisfactory comfort level.

COOLING STARTUP

NOTE: Check all manual reset limit controls in heating circuit if cooling mode does not operate.

Compressor Protection Devices

The compressor includes components which are designed to protect the compressor against abnormal operating conditions.



WARNING

TO PREVENT PERSONAL INJURY OR DEATH, ALWAYS DISCONNECT ELECTRICAL POWER BEFORE INSPECTING OR SERVICING THE UNIT. ALL COMPRESSOR PROTECTION DEVICES RESET AUTOMATICALLY, ENERGIZING THE CONTACTOR AND OUTDOOR FAN.

Operating Instructions (Cooling)

NOTE: Mechanical cooling cannot be reliably provided at ambient temperatures below 50° F.

1. Turn on the electrical power supply to the unit.
2. Place the room thermostat selector switch in the COOL position (or AUTO if available, and if automatic changeover from cooling to heating is desired).
3. Set the room thermostat to the desired temperature.

TROUBLESHOOTING

ABNORMAL OPERATION - HEATING

The following presents probable causes of questionable unit operation. Remove the control box access panel and note the number of diagnostic LED flashes. Refer to *Diagnostic Indicator Chart* for an interpretation of the signal and to this section for an explanation.

Internal Lockout

If the integrated ignition control in this unit encounters an internal fault, it will go into a "hard" lockout and turn off the diagnostic

LED. If diagnostic LED indicates a hard lockout, check power supply to unit for proper voltage, check all fuses, circuit breakers and wiring. Disconnect electric power for five seconds. If LED remains off after restoring power, replace control.

External Lockout

An external lockout occurs if the integrated ignition control determines that a measurable combustion cannot be established within three (3) consecutive ignition attempts. If flame is not established within the seven (7) second trial for ignition, the gas valve is deenergized, 15 second inter-purge cycle is completed, and ignition is re-attempted. The control will repeat this routine three times if a measurable combustion is not established. The control will then shut off the induced draft blower and go into a lockout state.

If flame is established but lost, the control will energize the circulator blower at the heat speed and then begin a new ignition sequence. If flame is established then lost on subsequent attempts, the control will recycle for four (4) consecutive ignition attempts (five attempts total) before locking out.

The diagnostic fault code is 1 flash for a lockout due to failed ignition attempts or flame dropouts. The integrated control will automatically reset after one hour, or it can be reset by removing the thermostat signal or disconnecting the electrical power supply for five seconds.

Important: If you have to frequently reset your gas/electric package unit, it means that a problem exists that should be corrected. Contact a qualified servicer for further information.

Pressure Switch Stuck Open

A pressure switch stuck open can be caused by a faulty pressure switch, faulty wiring, a disconnected or damaged hose, a blocked or restricted flue, or a faulty induced draft blower.

If the control senses an open pressure switch during the pre-purge cycle, the induced draft blower only will be energized. If the pressure switch opens after ignition has begun the gas valve is deenergized, the circulator blower heat off cycle begins, and the induced draft blower remains on. The diagnostic fault code is two flashes.

Pressure Switch Stuck Closed

A stuck closed pressure switch can be caused by a faulty pressure switch or faulty wiring. If the control encounters a pressure switch stuck closed, the induced draft blower remains off. The diagnostic LED code for this fault is three (3) flashes.

Open Thermal Protection Device

If a primary, auxiliary, or rollout limit switch opens, the gas valve is immediately deenergized, the induced draft and air circulating blowers are energized. The induced draft and air circulator blowers remain energized until the limit switch recloses. The diagnostic fault code for an open limit is four (4) flashes.

A primary limit will open due to excessive supply air temperatures. This can be caused by a dirty filter, excessive duct static, insufficient air flow, or a faulty limit. Check filters, total external duct static, blower motor, blower motor speed tap (see wiring diagram), and limit. This limit will automatically reset once the temperature falls below a preset level.

An automatic reset auxiliary limit is located on the circulator blower scroll. A dirty filter, excessive duct static, insufficient air flow, a faulty limit, or a failed circulator blower can cause this limit to open. Check filters, total external duct static, circulator blower motor, blower motor speed tap (see wiring diagram), and limit. An interruption in electrical power during a heating cycle may also cause the auxiliary limit to open. The secondary limit is located on top of the circulator blower assembly (see

Secondary Limit Control figure).

If the burner flames are not properly drawn into the heat exchanger, the flame rollout protection device will open. The rollout limit is a manual reset limit located on the burner bracket. The cause of the flame rollout must be determined and corrected before resetting the limit. Possible causes are restricted or blocked flue passages, blocked or cracked heat exchanger, a failed induced draft blower, or insufficient combustion air.

Important: If a limit opens five (5) times within a single call for heat, the ignition control will go into a 30-minute lockout. Only the air circulator blower remains on during this lockout. The diagnostic fault code for this condition is "8" flashes and the control automatically resets after 30 minutes. A dirty filter is the most likely cause for the fault.

Flame Detected with Gas Valve Closed

If flame is sensed with the gas valve deenergized, the combustion and air circulator blowers are energized. The diagnostic fault code is five (5) flashes for this condition. The control can be reset by removing the power supply to the unit or it will automatically reset after one hour. Miswiring is the probable cause for this fault.

Low Flame Sensor Current

If the flame sense current drops below approximately one microamp DC, the diagnostic LED will flash seven (7) times. The control will function normally until it can no longer sense flame. If this fault code is encountered, have a qualified service technician remove the sensor and clean it with steel wool.

Gas Valve Energized When It Should Be OFF

Some models utilize an ignition control that recognizes voltage present at the gas valve when the gas valve should be off. If the ignition control senses this fault, it will lockout all functions except continuous fan. This fault is indicated by (9) flashes. Possible causes are miswiring, shorts in the wire harness, or corrosion at the burners. Check and correct wiring if required. Inspect and clean burners if required. Power to the unit must be removed in order to reset the control from lockout.

ABNORMAL OPERATION - COOLING

Short Cycle Compressor Delay

The automatic ignition control has a built-in feature that prevents damage to the compressor in short cycling situations. In the event of intermittent power losses or intermittent thermostat

operation, the ignition control will delay output to the compressor contactor for three minutes from the time power is restored. (Compressor is off a total of three minutes). The diagnostic LED will flash six (6) times to indicate the compressor contactor output is being delayed.

NOTE: Some electronic thermostats also have a built-in compressor short cycle timer that may be longer than the three minute delay given above. If you are using an electronic thermostat and the compressor has not started after three minutes, wait an additional five minutes to allow the thermostat to complete its short cycle delay time.

MAINTENANCE

Have the gas heating section of the unit checked at least once a year before the heating season begins, to be sure that the combustion air inlet and flue outlet hoods are not blocked by debris, which would prevent adequate combustion air and a properly operating vent system.



WARNING

TO AVOID PERSONAL INJURY OR DEATH DUE TO ELECTRIC SHOCK, DISCONNECT ELECTRICAL POWER BEFORE PERFORMING ANY MAINTENANCE.

REPLACING OR CLEANING FILTER

A return air filter is not supplied with this unit; however, there must be a means of filtering all of the return air. The filter(s) may be located in the return air duct(s), or return air filter grille(s). Consult with your installing dealer for the actual location of the return air filter(s) for your unit.

Dirty filters are the most common cause of inadequate heating or cooling performance. Filter inspection should be made at least every two months; more often if necessary because of local conditions and usage.

Dirty throwaway filters should be discarded and replaced with a new, clean filter. Dirty permanent filters should be washed with water, thoroughly dried and sprayed with a filter adhesive before being reinstalled. (Filter adhesives may be found at many hardware stores.) Permanent filters should last several years. However, should one become torn or uncleanable, it should be replaced.

IGNITION CONTROL DIAGNOSTIC INDICATOR CHART

Light Signal	Refer to Abnormal Heating or Cooling Operation Sections of this Manual
Off	Internal Lockout
1 Flash	External Lockout
2 Flashes	Pressure Switch Stuck Open
3 Flashes	Pressure Switch Stuck Closed
4 Flashes	Open Thermal Protection Device
5 Flashes	Flame Sensed with Gas Valve Closed
6 Flashes	Short Cycle Compressor Delay (Cooling)
7 Flashes	Low Flame Sense Current
8 Flashes	Thermal Protection Device Open
9 Flashes	Gas Valve Energized When It Should Be OFF (<i>DSI-1 Control Only</i>)

MAINTAINING CABINET FINISH

Use a fine grade automotive wax on the cabinet finish to maintain the finish's original high luster. This is especially important in installations with extended periods of direct sunlight.

CLEAN OUTSIDE COIL (QUALIFIED SERVICER ONLY)

The coil with the outside air flowing over it should be inspected annually and cleaned as frequently as necessary to keep the finned areas free of lint, hair and debris.

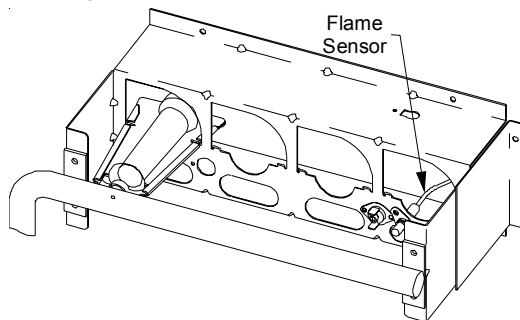
CONDENSER, EVAPORATOR, AND INDUCED DRAFT MOTORS

Bearings on the air circulating blower motor, condenser motor and the combustion fan motor are permanently lubricated. No additional oiling is required.

FLAME SENSOR (QUALIFIED SERVICER ONLY)

A drop in the flame sensing signal can be caused by a nearly invisible coating on the flame sensor. This coating, created by the fuel or combustion air supply, can be removed by carefully cleaning the flame sensor with steel wool.

NOTE: After cleaning, the microamp signal should be stable and in the range of 4 - 6 microamps DC.



Flame Sensor Location

FLUE PASSAGES (QUALIFIED SERVICER ONLY)

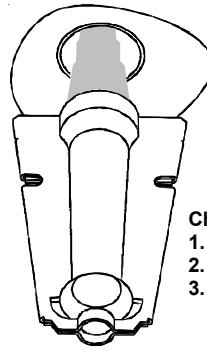
At the start of each heating season, inspect and, if necessary, clean the unit flue passage.

Cleaning Flue Passages (Qualified Servicer Only)

1. Shut off electric power and gas supply to the unit.
2. Remove burner assembly by disconnecting the gas line and removing the manifold bracket from the partition panel.
3. Remove the flue from the induced draft blower and the collector box from the partition panel.
4. The primary heat exchanger tubes can be cleaned using a round wire brush attached to a length of high grade stainless steel cable, such as drain cleanout cable. Attach a variable speed reversible drill to the other end of the spring cable. Slowly rotate the cable with the drill and insert it into one of the primary heat exchanger tubes. While reversing the drill, work the cable in and out several times to obtain sufficient cleaning. Use a large cable for the large tube, and then repeat the operation with a small cable for the smaller tube. Repeat for each tube.
5. When all heat exchanger tubes have been cleaned, replace the parts in the reverse order in which they were removed.
6. To reduce the chances of repeated fouling of the heat exchanger, perform the steps listed in "Startup, Adjustments, and Checks".

MAIN BURNER FLAME (QUALIFIED SERVICER ONLY)

Flames should be stable, soft and blue (dust may cause orange tips but must not be yellow). The flames must extend directly outward from the burner without curling, floating or lifting off.



Check the burner flames for:

1. Good adjustment
2. Stable, soft and blue
3. Not curling, floating, or lifting off.

Burner Flame

WARNING

TO AVOID PERSONAL INJURY OR DEATH DUE TO ELECTRIC SHOCK, DO NOT REMOVE ANY INTERNAL COMPARTMENT COVERS OR ATTEMPT ANY ADJUSTMENT. CONTACT A QUALIFIED SERVICER AT ONCE IF AN ABNORMAL FLAME SHOULD DEVELOP.

At least once a year, prior to or during the heating season, make a visual check of the burner flames.

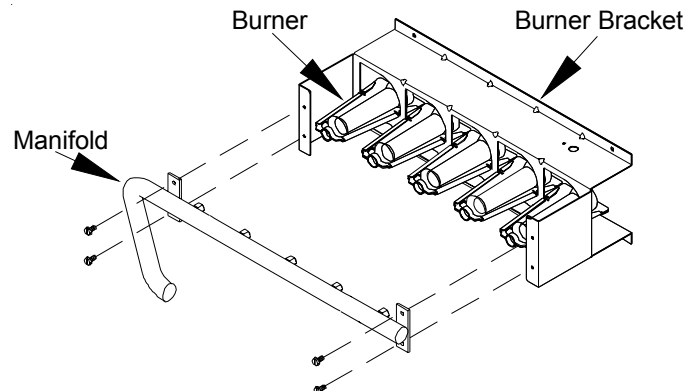
NOTE: This will involve removing and reinstalling the heat exchanger door on the unit, which is held by two screws. If you are uncertain about your ability to do this, contact a qualified servicer.

If a strong wind is blowing, it may alter the airflow pattern within the unit enough that an inspection of the burner flames is not possible.

CLEANING BURNERS

1. Shut off electric power and gas supply to the unit.
2. Remove the screws holding the burner retention bracket in place.

NOTE: On some models it will be necessary to remove the manifold instead of a burner retention bracket. In such a case, remove the manifold and rotate each burner counterclockwise to remove.



Burner Bracket and Manifold

3. Remove the burners.
4. Use a bottle brush to clean burner insert and inside of the burners.
5. Replace burners and burner retention bracket or manifold, inspect the burner assembly for proper seating of burners in retention slots.
6. Reconnect electrical power and gas supply.



CAUTION

**LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS.
WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION.**



CAUTION

ALWAYS VERIFY PROPER OPERATION AFTER SERVICING.

For further information on the yearly inspection, consult the User Manual. It is recommended that a qualified servicer inspect and service the unit at least once each year.

Turn the unit on at the thermostat. Wait a few minutes, since any dislodged dust will alter the normal flame appearance. Flames should be predominantly blue and directed into the tubes. They should not be yellow. They should extend directly outward from the burner ports without curling downward, floating or lifting off the ports.

ACCESSORIES AND FUNCTIONAL PARTS

SHEET METAL ACCESSORIES

Additional accessories, as described below can be purchased to fit specific application needs. Parts and instructions are available from your distributor.

Accessory

Over/Under Duct Cover Kit
Horizontal Duct Covers*
Compressor Sound Blanket
Propane Gas Conversion Kit
High Altitude Kit
Roof Curbs

FUNCTIONAL PARTS

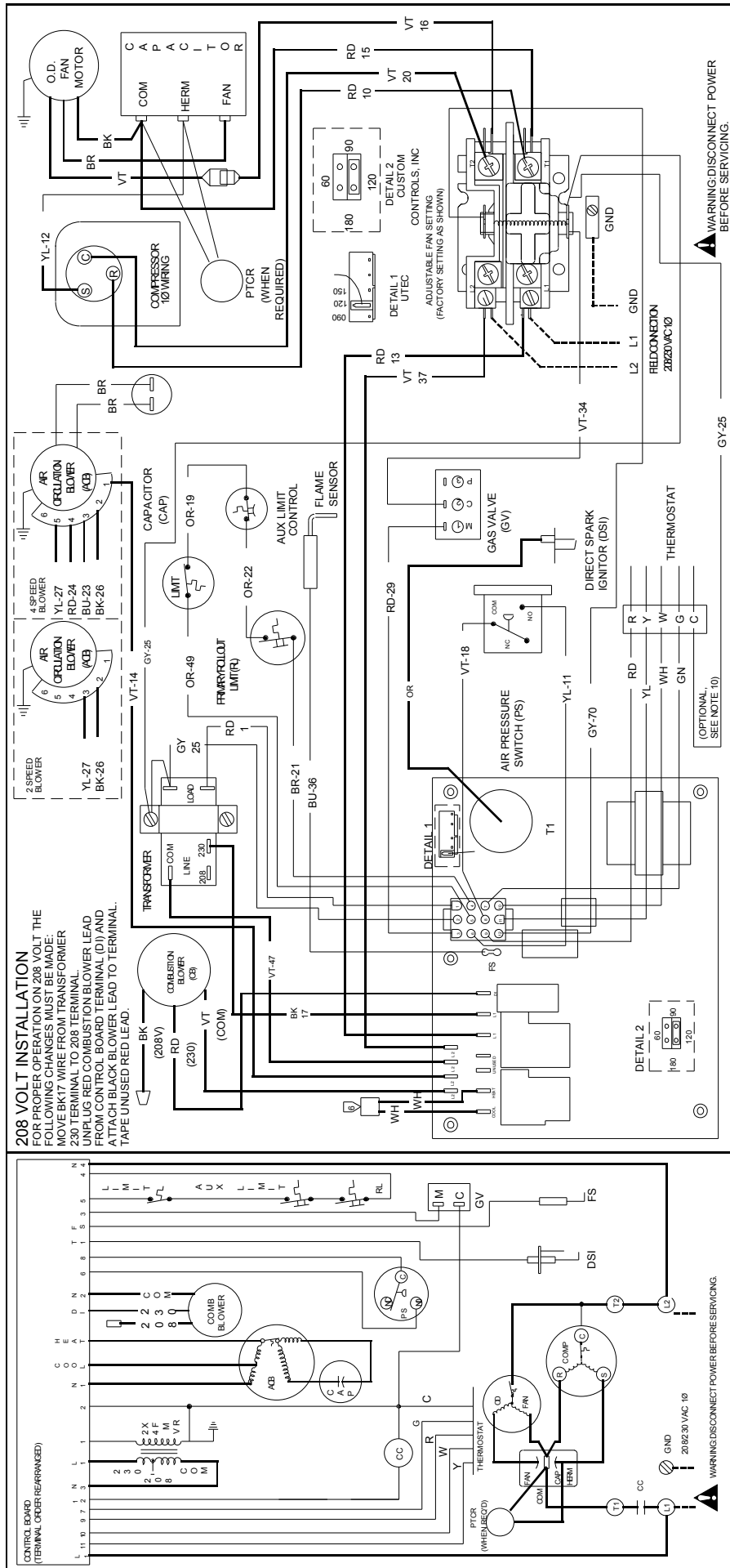
Functional Parts

Auxiliary Limit Switch	Flame Roll-Out Switch
Blower Housing	Flame Sensor
Circulator Blower Motor	Gas Orifice
Blower Wheel	Gas Valve
Burner	Heat Exchanger
Capacitor	High Limit Switch
Compressor	Ignitor
Condenser Coil	Ignition Control
Condenser Fan Blade	Inducted Draft Motor
Condenser Fan Motor	Pressure Switch
Contactors	Pressure Switch Hose
Manifold	Transformer
Evaporator Coil	

Although only functional parts are shown, all sheet metal parts, doors, etc. may be ordered by description. Parts are available from your distributor. Be sure to provide the unit model, manufacturing, and serial numbers with the order.

WARNING

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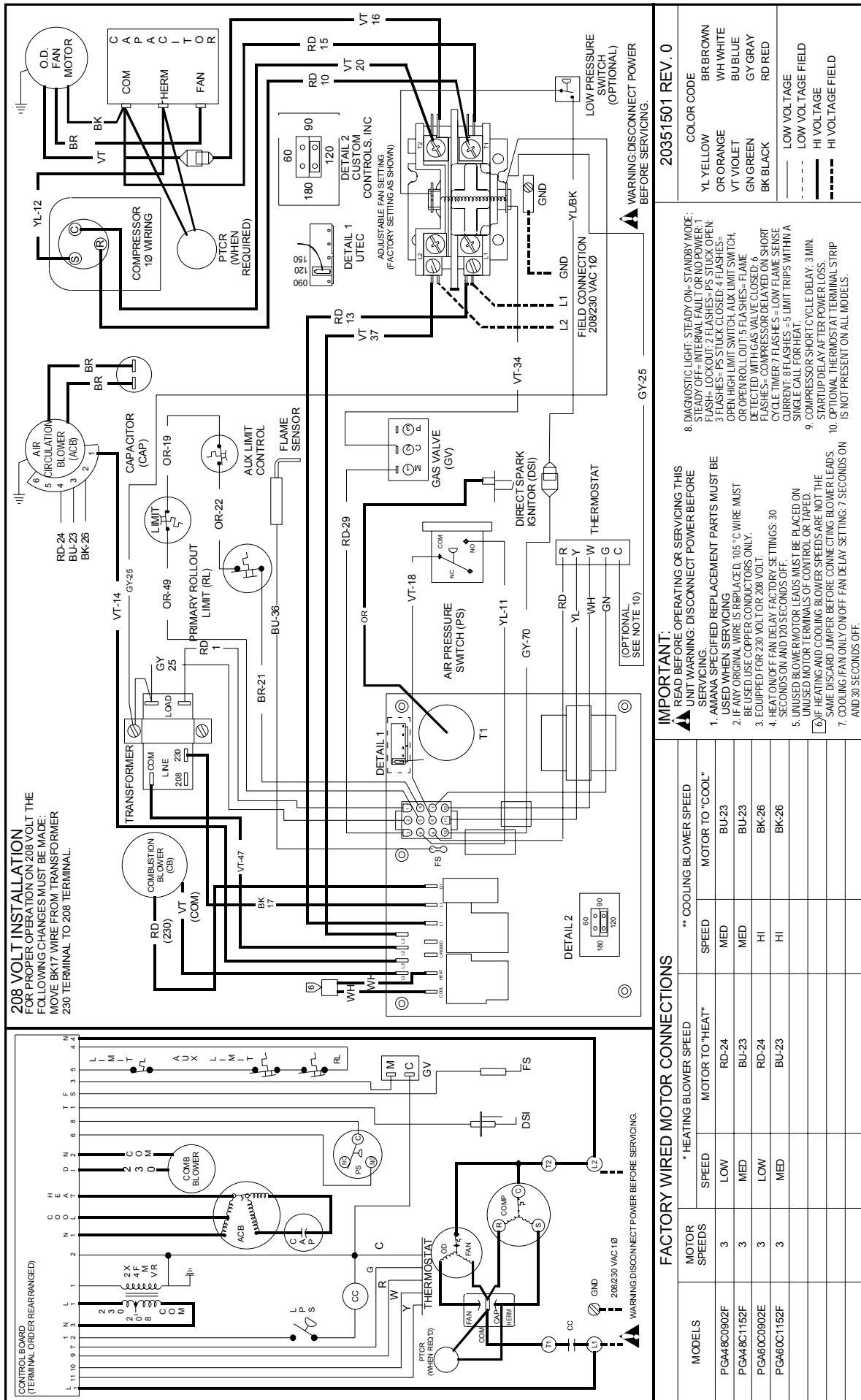


FACTORY WIRED MOTOR CONNECTIONS					IMPORTANT:		8 DO NOT TOUCH THESE CONNECTIONS BEFORE SERVICING OR REPAIRING THE UNIT. WARNING: DISCONNECT POWER BEFORE SERVICING.		20351601 REV. 2	
MODELS	MOTOR SPEEDS	* HEATING BLOWER SPEED		** COOLING BLOWER SPEED		1. ALWAYS SPECIFIED REPLACEMENT PARTS MUST BE USED WHEN SERVICING.	2. FAN VOLTAGE MUST BE USED TO DETERMINE THE CORRECT WIRE GAUGE. (SEE TABLE 1 FOR FAN VOLTAGE AND WIRE GAUGE REQUIREMENTS.)	3. FAN VOLTAGE MUST BE USED TO DETERMINE THE CORRECT WIRE GAUGE. (SEE TABLE 1 FOR FAN VOLTAGE AND WIRE GAUGE REQUIREMENTS.)	4. FAN VOLTAGE MUST BE USED TO DETERMINE THE CORRECT WIRE GAUGE. (SEE TABLE 1 FOR FAN VOLTAGE AND WIRE GAUGE REQUIREMENTS.)	COLOR CODE
		SPEED	MOTOR TO "HEAT"	SPEED	MOTOR TO "COOL"					
PGA24C0702F	4	MED HI	BU-23	LOW	YL-27					YL YELLOW
PGA30C0702F	4	MED HI	BU-23	MED LOW	RD-24					OR ORANGE
PGA36C0702F	4	MED HI	BU-23	MED HI	BU-23					VT VIOLET
PGA36C0902F	4	HI	BK-26	MED HI	BU-23					GN GREEN
PGA42C0902F	2	HI	BK-26	HI	BK-26					BK BLACK

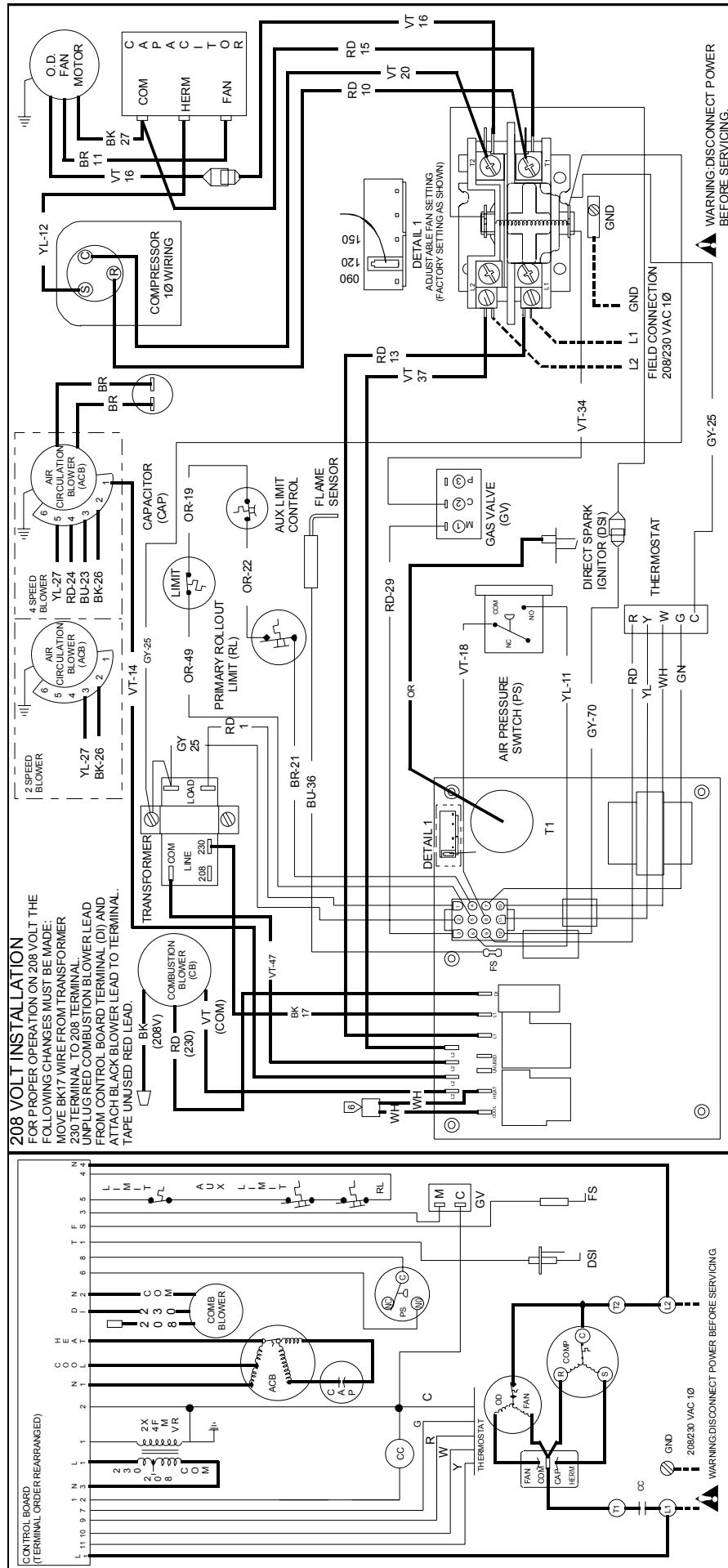


WARNING

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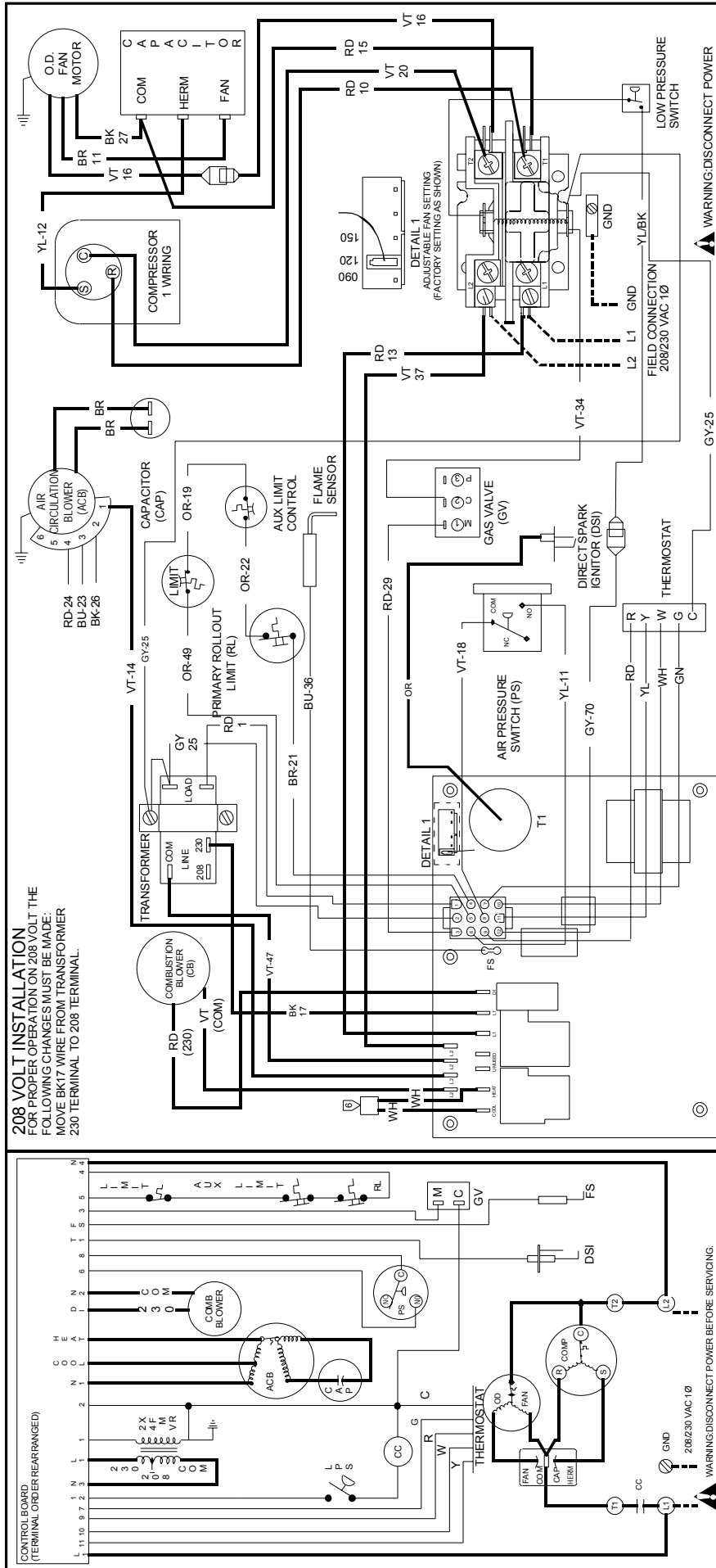
TO PREVENT PROPERTY DAMAGE, PERSONAL INJURY OR DEATH, DISCONNECT ELECTRICAL POWER TO THIS FURNACE BEFORE SERVICING OR PERFORMING MAINTENANCE.

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WARNING

TO PREVENT PROPERTY DAMAGE, PERSONAL INJURY OR DEATH, DISCONNECT ELECTRICAL POWER TO THIS FURNACE BEFORE SERVICING OR PERFORMING MAINTENANCE.



FACTORY WIRED MOTOR CONNECTIONS

MODELS	MOTOR SPEEDS	* HEATING BLOWER SPEED		** COOLING BLOWER SPEED	
		SPEED	MOTOR TO "HEAT"	SPEED	MOTOR TO "COOL"
PG842C1152E	3	MED	BU-23	LOW	RD-24
PG848C0902E	3	LOW	RD-24	MED	BU-23
PG848C1152E	3	MED	BU-23	MED	BU-23
PG848C1402E	3	HI	BK-26	MED	BU-23
PG860C0902E	3	LOW	RD-24	HI	BK-26
PG860C1152E	3	MED	BU-23	HI	BK-26
PG860C1402E	3	HI	BK-26	HI	BK-26

IMPORTANT:
READ BEFORE OPERATING OR SERVICING THIS UNIT.
UNIT WARNING: DISCONNECT POWER BEFORE SERVICING.

1. ALWAYS SPECIFIED REPLACEMENT PARTS MUST BE USED WHEN SERVICING.
2. IF ANY ORIGINAL WIRE IS REPLACED, 105 °C WIRE MUST BE USED. USE COPPER CONDUCTORS ONLY.
3. EQUIPPED FOR 230 VOLT OR 208 VOLT.
4. HEAT ON/OFF FAN DELAY FACTORY SETTINGS: 30 SECONDS ON AND 120 SECONDS OFF.
5. UNUSED BLOWER MOTOR LEADS MUST BE PLACED ON UNUSED MOTOR TERMINALS OF CONTROL OR TAPED.
6. IF HEATING AND COOLING BLOWER SPEEDS ARE NOT THE SAME DISCARD JUMPER BEFORE CONNECTING BLOWER LEADS.
7. COOLING /FAN ONLY ON/OFF FAN DELAY SETTING: 7 SECONDS ON AND 30 SECONDS OFF.
8. DIAGNOSTIC LIGHT: STEADY ON= STANDBY MODE; STEADY OFF= INTERNAL FAULT OR NO POWER; 1 FLASH= LOCKOUT; 2 FLASHES= PS STUCK OPEN; 3 FLASHES= PS STUCK CLOSED; 4 FLASHES= OPEN HIGH LIMIT SWITCH; AUX LIMIT SWITCH, OR OPEN ROLL OUT; 5 FLASHES= FLAME DETECTED WITH GAS VALVE CLOSED; 6 FLASHES= COMPRESSOR DELAYED ON SHORT CYCLE TIMER; 7 FLASHES= LOW FLAME SENSE CURRENT; 8 FLASHES= 5 LIMIT TRIPS WITH A SINGLE CALL FOR HEAT.
9. COMPRESSOR SHORT CYCLE DELAY: 3 MIN STARTUP DELAY AFTER POWER LOSS.

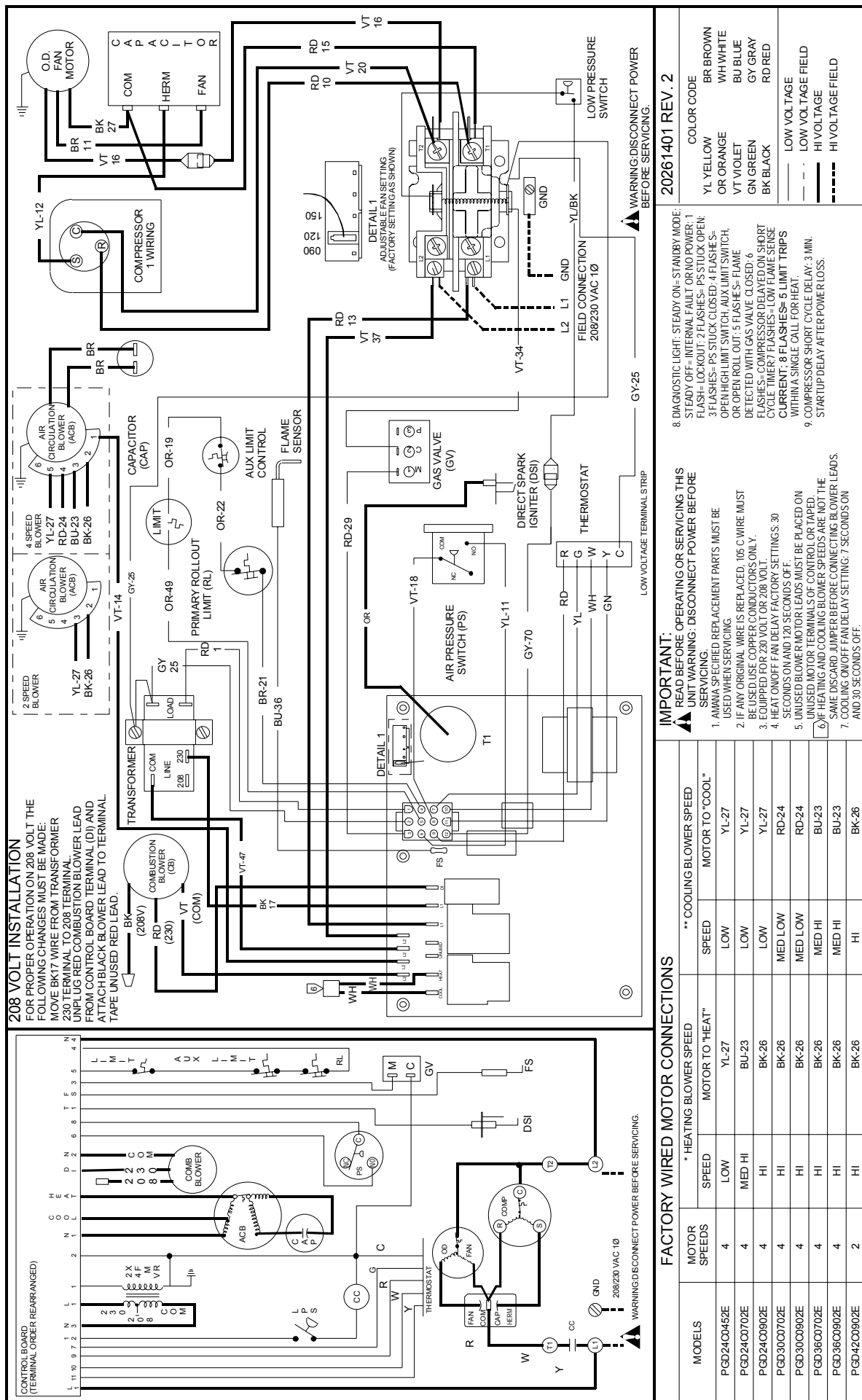
20261201 REV. 2

COLOR CODE	
YL YELLOW	BR BROWN
OR ORANGE	WH WHITE
VT VIOLET	BU BLUE
GN GREEN	GY GRAY
BK BLACK	RD RED
---	LOW VOLTAGE
---	LOW VOLTAGE FIELD
---	HI VOLTAGE
---	HI VOLTAGE FIELD



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